

Remarks/Arguments:

By this Amendment, Applicants have amended claims 4 and 8, and have deleted claim 10. Claims 4, 8 and 9 are pending.

Specification Objection

At page 2 of the Office Action, the Examiner requested an update to the status of the parent application, Application Serial No. 09/907,188. Applicants have amended the specification to indicate that this application has issued as U.S. Patent No. 6,609,458 on August 26, 2003.

In addition, the Office Action objects to the specifications failing to provide proper antecedent basis for the claimed subject matter. In this connection, the Office Action takes the position that there is no support for "varying" the squeegee speed as recited in claim 10. The Office Action does, however, admit that there is support for "changing" the squeegee speed and pressure as set forth in claim 9. Applicants have cancelled claim 10 to overcome the basis for the objection.

Applicants note that the Office Action identifies page 18, line 30, and page 19, line 7 as support for the "changing" of the squeegee speed and pressure. Applicants contend that there is support for this feature of Applicants' claimed invention throughout the specification, and also identify in this connection the disclosure in the originally filed application at page 16, lines 9 - 10.

The Examiner also points out at page 2 of the Office Action, that "should claim 9 be found allowable, claim 10 will be objected to under 37 C.F.R. 1.75 as being a substantial duplicate thereof." Applicants have, however, cancelled claim 10 by this Amendment.

Also, the Abstract of the disclosure is objected to "because it makes no mention of the claimed invention." Applicants have amended the Abstract to more clearly set forth the field of Applicants' claimed invention.

Claim Rejection Under Section 102

Claims 4 and 8 stand rejected under 35 U.S.C. §102(b) as being anticipated by Higashida. By this Amendment, Applicants respectfully traverse this Section 102(b) rejection.

Claims 4 and 8 are independent claims. Turning first to independent claim 4, it is directed to a screen printing apparatus and includes the following features:

- a positioner for positioning a substrate relative to a mask plate having a pattern hole,
- a fill-in detector for **three dimensionally determining** an extent to which said hole is filled with said solder,
- a print-condition correction unit for modifying printing on the substrate using the mask based on the determined extent.

Applicants contend that the screen printing apparatus defined by claim 1 is patentably distinguished from the Higashida Reference at least based on the requirement that the fill-in detector determined three-dimensionally the extent to which the hole is filled with solder. This feature is neither taught nor suggested in the Higashida Reference.

The Amendment to claim 4 more specifically indicating that the fill-in detector three dimensionally determines an extent to which the hole is filled with solder is not the addition of new matter, but is based on the application as originally filed. For example, Applicants point to the following sections of the originally filed Application for support of this amendment: page 8, lines 29-30; page 9, lines 9-11; and page 10, lines 17-19.

The Higashida Reference relates in general to a printing method and apparatus. In the filling of a paste in Higashida, a temperature gradient at a paste-pressing face is managed by a heater incorporated in a filling head. Alternatively, a nonvolatile component is applied to a printing face of a base material before the paste is filled, to prevent a volatile component of the paste from evaporating over time. A viscosity of the paste is thereby secured. Higashida copes with the change of quantity of the paste by changing a moving speed of the filling head or a

contact angle of the filling head in the printing phase, or by supporting the filling head at the side in touch with the printing face.

More specifically, the Office Action refers to the disclosure of the Higashida Reference at page 5, lines 52-56 as teaching "a filled-in detector." But Applicants note that the Higashida Reference uses "pressure difference" to detect the fill-in state of the paste. This is in sharp contrast to the fill-in detector of Applicants' claimed invention which three-dimensionally determines the extent to which a hole is filled with solder. Thus, there is a structural difference between the screen printing apparatus defined by Applicants' claim 4 and the disclosure of a fill-in detector in the Higashida Patent. Because the Higashida Patent lacks any teaching or suggestion of a three-dimensional fill-in detector as set forth in Applicants' claim 4, the Section 102(b) rejection directed to claim 4 should be withdrawn.

Independent claim 8 is directed to a method of screen printing and includes the step of "three-dimensionally determining an extent to which said hole is filled with paste." As Applicants note above, there is simply no teaching or suggestion in the Higashida Reference of three-dimensionally determining an extent to which a hole is filled with paste. Thus, this feature patentably distinguishes independent claim 8 from the Higashida Patent.

Based on the foregoing remarks, Applicants request that the Section 102(b) rejection directed to claims 4 and 8 be withdrawn.

Claims 9 and 10 stand rejected under 33 U.S.C. §103(a) as being unpatentable over Higashida in view of Legault. By this Amendment, Applicants respectfully traverse the Section 103(a) rejection.

Claim 9 is dependent on claim 8, and claim 10 has been cancelled. Claim 9 includes the three-dimensionally determining step of claim 8, and on this basis is patentably distinguished from the Higashida Patent. It is Applicants' further contention that the Legault Patent does not rectify the deficiencies of the Higashida References as heretofore discussed.

The Legault Patent has been cited as disclosing "that both squeegee speed and squeegee pressure affect the filling of solder in the holes." In this connection, the Office Action refers to column 4, lines 9-17, and lines 21-34 of the Legault Patent. While the Legault Patent indicates

that it is desirable to have the solder deposits completely fill the volume defined by a stencil opening, and that control of this goal includes squeegee velocity and downward pressure on the squeegee, there is no teaching of three-dimensionally determining the extent to which the hole is filled with paste as required in the method defined by claim 8, to which claim 9 depends. Applicants note that in the Legault Patent there is "three-dimensional" inspection system 18, but this system 18 as described at column 3 of the Legault Patent determines "solder height." It is not a three dimensional determination. Thus it does not appear to Applicants that the Legault Patent is teaching the step of "three-dimensionally determining an extent to which said hole is filled with paste" as required by Applicants' claim 9, being dependent on claim 8. Applicants' therefore contend that the Higashida Patent does not rectify the deficiencies heretofore discussed with respect to the Higashida Reference. Applicants therefore request that the Section 103(a) rejection directed to claim 9 be withdrawn.

In view of the foregoing remarks and amendments, Applicants respectfully submit that claims 4, 8 and 9 are in condition for allowance. Reconsideration and allowance of all pending claims are respectfully requested.

Respectfully submitted,

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Attachments: Abstract

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Daniel N. Calder

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ABSTRACT

A screen printing apparatus prints cream solder through a pattern hole of a mask plate, to which a substrate is brought into contact, by sliding a squeegee head. A three dimensional detector, such as a laser, is used to determine the extent to which the pattern hole is filled with the cream solder. Based on the determination result, the printing operation is modified, with respect to the positioning of the mask plate and substrate, to maintain the printing quality.